

ABSTRACT OF THE DISCLOSURE

A spin-valve thin-film magnetic element includes a substrate, a laminate formed on the substrate, biasing layers, and conductive layers. The laminate includes a free magnetic layer; a first nonmagnetic conductive layer, a first pinned magnetic layer and a first antiferromagnetic layer deposited on the upper surface, away from the substrate, of the free magnetic layer; a second nonmagnetic conductive layer, a second pinned magnetic layer and a second antiferromagnetic layer deposited on the lower surface, near the substrate, of the free magnetic layer. The biasing layers orients the magnetization vector of the free magnetic layer in a direction perpendicular to the magnetization vector of the pinned magnetic layers, and the conductive layers supplies a sensing current to the free magnetic layer. The first antiferromagnetic layer adjoining the first pinned magnetic layer fixes the magnetization vector of the first pinned magnetic layer in one direction. The second antiferromagnetic layer adjoining the second pinned magnetic layer fixes the magnetization vector of the second pinned magnetic layer in a direction antiparallel to the magnetization vector of the first pinned magnetic layer. In addition, the first and second antiferromagnetic layers are composed of an alloy comprising Mn and at least one

element selected from the group consisting of Pt, Pd, Ir, Rh,
Ru, Os, Au, Ag, Cr, Ni, Ne, Ar, Xe and Kr.